

REMARKS

Applicant concurrently files herewith a Petition and fee for a Three-month Extension of time.

Claims 1-22 are all the claims presently pending in the application.

It is noted that the claims have been amended solely to more particularly point out Applicant's invention for the Examiner, and not for distinguishing over the prior art, narrowing the claims in view of the prior art, or for statutory requirements directed to patentability.

Claims 1-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent 6,162,654 to Kawabe, further in view of US Patent 5,994,721 to Zhong et al., US Patent 5,922,401 to Kashiwazaki et al, and Applicant's Admitted Prior Art to Lee.

This rejection is traversed in view of the discussion below.

A significant feature of the present invention is that a remaining portion of the passivation film 11 exists between a contact hole 5 and a pixel opening portion 6 as shown in Figure 4. An additional feature of the present invention is that a stacked portion of the gate insulation layer 10 and the passivation film 11 is disposed between the contact hole 5 and the pixel opening portion 6.

Zhong cannot be said to suggest such features. There is no hint to provide such remaining portion of the passivation film 11 between the contact hole 5 and the pixel opening portion 6. If such remaining portion is eliminated as in Zhong, thickness of the color layer on the TFT becomes large compared with the present invention. Without the technical concepts taught in the present invention, there is no reason to intentionally provide the small portion of the passivation film 11 so as to face both the contact hole 5 and the pixel opening portion 6.

Moreover, the Examiner improperly combines references by taking words out of context in the prior art reference and attempting to redefine the significance of these words.

As will be shown below, Zhong is not properly combinable with Kawabe, since the phraseology that the Examiner extracts from Zhong is a solution to reduce the parasitic capacitance of the configuration of the prior art of Zhong. It is not a motivation to make changes

to Kawabe.

Moreover, Kashiwazaki is likewise not properly combinable with Kawabe or Zhong, since the phraseology relied upon by the Examiner is not at all causatively correlated with the feature to which the Examiner attributes it. Additionally, the Examiner's reliance upon Lee as teaching an overcoat layer is irrelevant since the present invention does not attempt to claim an overcoat layer as an abstract concept. The overcoat layer shown in the second embodiment of the present invention is one layer that helps define a stack of layers that reduces the thickness of the color filter material in the region of the through hole and has the additional benefit that it can also serve as a mask for forming the through hole.

Until the Examiner updates the rejection currently of record to address these problems, the rejection will make very little engineering sense to the Board of Appeals, since it is very deceptive unless the reader takes time to separately interpret the selected wording in the context of the reference itself, rather than relying on the Examiner's extracted, incorrect, and misleading interpretation.

I. THE CLAIMED INVENTION

Applicant's invention, as defined for example in independent claim 1 and substantially similarly in independent claims 2, 6, and 7) is directed to an active matrix liquid crystal display device (LCD) having a color filter on a substrate on which switching elements are formed.

A feature of the present invention is that a portion of a passivation film, covering a display area to be covered with a color filter, is selectively removed and a hole formed therein. Then, the hole area is filled with a color filter while another portion of the passivation film covers a thin film transistor (TFT).

Thus, it is possible to make a color filter on a contact portion and on a pattern outline portion thin, while the color filter on the pixel opening portion is thick. In this manner, a high photosensitive color resist can be used and a fine pattern with small exposure can be formed. Thus, an LCD having good display quality, high precision and a high aperture can be

manufactured (e.g. see page 5, lines 13-24; page 11, lines 25-27; page 12, lines 1-2, page 13, lines 9-18; and page 17, lines 1-12).

Essentially, as described beginning at line 13 of page 3 and continuing through line 10 of page 5, the inventor has recognized that the prior art has a number of problems due to the thickness of the color filter material over the TFT and, more specifically, in the drain region having the contact through hole to the pixel electrode. The present invention solves these problems by reducing the thickness of this color filter material in this region by choosing the number and thicknesses of underlying layers to achieve a thickness of overlying color filter material that will cure without causing the prior art problems in the drain region.

An exemplary configuration of the first embodiment is shown in Figure 3 in which passivation layer 11 on top of the TFT has a thickness approximately $0.3\text{ }\mu\text{m}$ and the color material on top the TFT has a thickness no greater than $0.4\text{ }\mu\text{m}$, thereby allowing the material to be cured without causing the problems noted in the prior art. The difference in thickness of the color filter material is further accentuated in the present invention by etching away the gate insulation layer 10 and passivation layer 11 in the pixel area prior to forming the color filter.

In an exemplary configuration of the second embodiment, as shown in Figure 5, an overcoat layer 19 is added on top of the color filter and provides several benefits, as described on page 16, including that of protecting the color filter and acting as a mask for forming the contact through hole, thereby achieving a higher aperture ratio and better display quality than that of embodiment 1.

The conventional systems, such as those discussed below and in the Related Art section of the present application, do not have such a structure, and fail to provide for such an operation.

Such combination of features is clearly not taught or suggested by the cited references.

Even assuming that the Examiner believes that the closest prior art reference would seem to be Zhong, Zhong clearly fails to teach the passivation layer on top of the TFT drain region. Indeed, Zhong does not even mention the prior art problems due to curing overly-thick color filter material in this region.

Although the Examiner concludes that Zhong "does not preclude a passivation film for

protecting said thin film transistors (TFTs)", it is the Examiner that introduces this passivation film into Zhong. That is, Zhong clearly teaches that no passivation layer is required to protect the TFT. Thus, it is unknown why and how the Examiner is attempting to incorporate such a layer into the structure of Kawabe.

Such introduction by the Examiner is precluded by MPEP 2143.01: "The mere fact that references can be combined or modified does not render the resultant combination obvious unless their prior art also suggests the desirability of the combination", (Emphasis in MPEP).

If the Examiner continues to maintain a rejection based upon including a passivation layer in Zhong, Applicant requests that a properly combinable reference be provided that overcomes the express teaching shown in Zhong that a passivation layer is not required to protect the TFT.

It is thus believed that the essential feature of the present invention would not be obvious from the teachings of Zhong and the well-known art in the liquid crystal field taking alone or in combination in any way. The Examiner's finding is nothing more than the hindsight.

In view of the foregoing, claims 1-22 are believed to clearly be patentable over Zhong.

II. THE PRIOR ART REJECTION

The prior art rejection currently of record fails to follow the appropriate format for a rejection. As best understood, the Examiner relies on Kawabe as being the primary reference. Accordingly, for a *prima facie* rejection, the Examiner has the burden to demonstrate that prior art can be properly combinable with Kawabe, thereby arriving at the claimed invention.

Therefore, relative to independent claims 1 and 6, the Examiner must provide a motivation to modify Kawabe at least as follows:

1. The structure of the TFT 102 must be inverted so that the gate electrode 13 is on the substrate surface 1. In Kawabe, the source/drain regions 14, 15 and the channel 16 are placed on the substrate surface.
2. The color filters 8a, 8b, 8c must be relocated to be on the surface of the substrate 1. In Kawabe, the color filters are located on top of the passivation layer 7.

3. The color filters 8a, 8b, 8c must contact the surface of the substrate 1 and must also cover the passivation layer 7 that covers the TFTs.

4. The relative location of color filters 8a, 8b, 8c and electrode 4 must be reversed so that the electrode 4 is on top of the color filter.

5. The thickness of the color filters must be reduced in the region of the electrode contact structure by leaving in place a passivation layer that covers the TFTs, through which the passivation layer is formed the contact hole.

Moreover, relative to independent claims 2 and 7, the Examiner must also introduce an overcoat layer, since Kawabe currently has no such layer. The Examiner incorrectly equates alignment layer 10 in Kawabe as an overcoat layer. As is true for all conventional liquid crystal layers, the present invention already has this alignment layer that is not shown in the figures but is described at lines 5-7 of page 10, lines 4 and 5 of page 13, lines 18-21 of page 14, and lines 10-13 of page 16. However, neither the alignment layer in Kawabe nor the alignment layer in the present invention serves the claimed purpose of the overcoat layer as including service as a mask for etching the contact holes.

As best understood, the Examiner relies on Zhong to presumably achieve one or more of the above-identified modifications. However, to one of ordinary skill in the art, the motivation provided in the rejection would be rather ludicrous.

That is, the Examiner points to column 6 at lines 1-65 and specifically points to lines 36-40. However, these lines describe a solution to the problem of a parasitic capacitance between pixel electrodes and address lines. Contrary to the Examiner's implication, these lines do not in any way contain any reason to modify the basic configuration of Kawabe.

Indeed, since Kawabe has no corresponding significant parasitic capacitance between the pixel electrodes and the address lines, one of ordinary skill in the art would reasonably consider that Zhong teaches against modifying Kawabe, since such modification would only introduce a new parasitic capacitance (and a new problem) between pixel electrodes and address lines.

Thus, Zhong is not in any way combinable with Kawabe using the rationale currently of record.

Moreover, even if Zhong were combined with Kawabe, the combination would still fail to achieve the present invention described by the independent claims, since the relative locations of components and layers are specifically identified in the claims and cannot be ignored, as identified below.

Hence, turning to the clear language of the claims, there is no teaching or suggestion of "... a plurality of thin film transistors ...each said thin film transistor comprising:

a gate electrode formed on said first substrate;

a gate insulation layer formed on said gate electrode;

a semiconductor layer formed on said gate insulation layer;

a drain electrode formed on a first portion of said semiconductor layer and a first portion of said gate insulation layer; and

a source electrode formed on a second portion said semiconductor layer and a second portion of said gate insulation layer;

a passivation film formed on said thin film transistors;

at least one color filter formed on said first substrate, said at least one color filter additionally covering said passivation layer;

a plurality of pixel electrodes, each respectively connected to one of said thin film transistors through a contact hole and each respectively formed on one of said at least one color filter; ...

wherein said color filter is formed directly on said first substrate in most of a light transmission region within a pixel area surrounded by said scanning lines and said signal lines, and said passivation film and said color film forms a stacked layer that reduces a thickness of material of said color filter near said contact hole by reason that a portion of said passivation film remains between said contact hole and said color filter material", as required by claims 1 and 2. Similar language is in claims 6 and 7.

Additionally, relative to claims 2 and 7, there is no overcoat layer in either Kawabe or Zhong.

As best understood, the Examiner introduces Kashiwazaki to demonstrate the color filter

directly on the substrate surface. Even with this characteristic, Kashiwazaki is irrelevant, since the color filter does not extend on top of the TFTs. Kashiwazaki teaches the use of specific ink recipes as applied very precisely in thin layers, in only the pixel areas themselves, using an ink-jet printing system. Kashiwazaki, therefore, is not properly combinable with either Kawabe or Zhong.

Moreover, the wording relied upon by the Examiner is irrelevant if used as a motivation to such combination. The Examiner attempts to interpret the wording at lines 37-47 of column 21 as a motivation to remove gate insulating film and the passivation film and deposit the color filter material directly on the substrate. However, a careful reading of Kashiwazaki shows that these words are used in all the EXAMPLE description sections and that this wording is contrasted with the descriptions in the COMPARATIVE EXAMPLE sections.

Thus, the results in Kashiwazaki, deceptively taken out-of-context, is actually not at all due to the placement of the color filter on the substrate, but, instead is due to the ink's recipe and the application method of using the ink-jet printer.

The Examiner relies on Lee to demonstrate an overcoat layer. However, this layer is not compatible with Kawabe, using the Examiner's motivation, since Kawabe passivation layer 7 already serves a leveling purpose. Nor is the overcoat layer of Lee combinable with Zhong, since Zhong color filter layer 101 already serves the leveling purpose.

For the reasons stated above, the claimed invention is fully patentable over the cited references.

Further, the other prior art of record has been reviewed, but it too, even in combination with Kawabe, Zhong, Kashiwazaki, and Lee, fails to teach or suggest the claimed invention.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-22, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at

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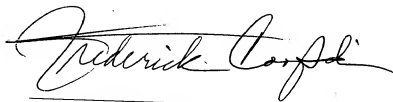
the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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